=> d his

(FILE 'HOME' ENTERED AT 12:26:56 ON 14 JAN 2008)
FILE 'CA' ENTERED AT 12:27:06 ON 14 JAN 2008
L1 4221 S OPTICAL (1A)(TWEEZ? OR TRAP? OR CAPTUR?)
L2 1027 S L1 AND TWEEZ?
L3 66 S L1 AND GRADIENT FORCE
L4 2 S L1 AND OPTICAL FORCE FIELD
L5 290 S L1 AND POLARIZ?
L6 1003 S L1 AND(PARTICLE OR MICROPARTICLE OR NANOPARTICLE OR BEAD OR MICROBEAD OR NANOBEAD OR MICROBALL OR MICROSPHERE OR NANOBALL OR NANOSPHERE OR PARTICULATE OR MICROPARTICULATE OR NANOPARTICULATE)
L7 498 S L6 AND(RAMAN OR SERS OR ARRAY OR DNA OR SINGLE(W)(CELL OR FILE OR ATOM PIPETTE) OR MICROFLUID? OR CALIBRAT? OR MANIPULAT? OR NOISY OR SIZING OR SORTING OR SORT OR QUADRANT)
L8 293 S L2-5 AND L7
L9 205 S L7 NOT L8
L10 57 S L9 AND(DNA ATTACH? OR OPTICAL MANIPULAT? SYSTEM OR SURFACE ENHANC? OR SERS OR VIDEO OR HYBRID? OR YEAST OR SORT? OR CONFOCAL/TI OR PHOTODETECT? OR CELLULAR OR SIZING OR SELF ORGANIZ? OR POLYMERASE OR SCREENING)
L11 93 S L8 AND(DNA ATTACH? OR OPTICAL MANIPULAT? SYSTEM OR SURFACE ENHANC? OR SERS OR VIDEO OR HYBRID? OR YEAST OR SORT? OR CONFOCAL/TI OR PHOTODETECT? OR CELLULAR OR SIZING OR SELF ORGANIZ? OR POLYMERASE OR SCREENING)
L12 111 S L8 AND(AUTOMAT? OR SEQUENC? OR HYPER OR SUBZEP? OR MEMS OR IMMUNO? OR ENZYMIC OR LAB OR CHIP OR SINGLE(W)(FILE OR MOLECULE))
L13 220 S L10-12
L14 112 S L13 AND PY<2005
L15 32 S L13 AND PATENT/DT
L16 847 S L2-5,L7 AND PY<2005
L17 20 S L16 AND(MICROFLUID? OR MICRO FLUID?)
L18 138 S L14-15,L17
FILE 'BIOSIS' ENTERED AT 13:48:03 ON 14 JAN 2008
L19 41 S L18
FILE 'MEDLINE' ENTERED AT 13:53:26 ON 14 JAN 2008
L20 53 S L18
FILE 'BIOSIS, MEDLINE' ENTERED AT 13:56:58 ON 14 JAN 2008
L21 71 DUP REM L19 L20 (23 DUPLICATES REMOVED)

=> d bib,ab l18 1-138

L18 ANSWER 14 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 143:342218 CA
TI Methods and **microfluidic** apparatus for performing nucleic acid **sequencing** and detection using **surface enhanced Raman** spectroscopy
IN Sundararajan, Narayanan; Sun, Lei; Zhang, Yuegang; Su, Xing; Chan, Selena; Koo, Tae-Woong; Berlin, Andrew A.
PA Intel Corporation, USA
SO U.S. Pat. Appl. Publ., 24 pp.
PI US 2005221333 A1 20051006 US 2004-815264 20040331
PRAI US 2004-815264 20040331
AB Methods and **microfluidic** app. for performing nucleic acid **sequencing** and detection using **surface enhanced Raman** spectroscopy are provided.

Methods can be performed in a **microfluidic** channel to functionalize a solid support such as a **bead** with a single nucleic acid. The **bead** with a single nucleic acid attached may be transported and released upstream of a detector using **optical tweezers**. The **optical tweezers** are typically a **gradient force optical trap** that captures the single **particle** downstream from the laser beam. The released **bead** can then flow downstream and either become trapped in a restriction barrier or attached to a surface. Once the **bead** is confined, the **optical tweezers** can be removed so that they do not interfere with an optical detector downstream. Single nucleotides can then be cleaved from the **bead** using an exonuclease. The single nucleotides may then be detected by **surface enhanced Raman** spectroscopy. The inclusion of a restriction barrier in a **microfluidic** channel and the immobilization of an optically transported **bead** allows removal of the **optical tweezers** from the optical path of a detection device, thereby preventing interference from the addnl. light source of the **optical tweezers** close to the collection vol. of the detector.

L18 ANSWER 18 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 143:92009 CA
TI Methods for high fidelity production of long nucleic acid molecules with error control
IN Carr, Peter A.; Chow, Brian Y.; Jacobson, Joseph M.
PA Massachusetts Institute of Technology, USA
SO PCT Int. Appl., 91 pp.

PI	WO 2005059096	A2	20050630	WO 2004-US41268	20041210
	US 2005227235	A1	20051013	US 2003-733855	20031210
PRAI	US 2003-733855	A	20031210		
	US 2002-432556P	P	20021210		

AB The invention relates to prodn. of long nucleic acid mols. with precise user control over **sequence** content. Long error-free nucleic acid mols. can be generated in parallel from oligonucleotides immobilized on a surface, such as a microarray comprising redundantly overlapped oligonucleotides. The movement of the growing nucleic acid mol. can be controlled through the stepwise repositioning of the growing mol. Stepwise repositioning refers to the position of the growing mol. as it interacts with the oligonucleotides immobilized on the surface. Synthesis relies on annealing complementary pairs of oligonucleotides and extending them to produce longer oligonucleotide segments, until the full-length **sequence** is produced. This invention also relates to the prevention and/or removal of errors within nucleic acid mols. A preferred embodiment of the invention utilizes a force-feedback system using magnetic and/or **optical tweezers**, either sep. or in combination. The solid-phase support is magnetic in nature and held in a fixed equil. position by applying an elec field and magnetic field gradient created by the magnetic **tweezers** that opposes the electrophoretic force. As the oligonucleotides are annealed to the growing strand, the neg. charged phosphate backbone adds charge to the **bead**-strand complex, which moves the **bead** from its equil. position. Optically detd. **bead** velocity and restoration force correspond to the no. of bases added; therefore, the length of the added strand can be ensured to be correct.

L18 ANSWER 25 OF 138 CA COPYRIGHT 2008 ACS on STN

AN 142:257284 CA
TI Method and device for biochemical detection and analysis of subcellular compartments from a **single cell**
IN Chiu, Daniel T.; Sun, Bingyun; Shelby, James Patrick; Edgar, John Scott; Jeffries, Gavin; Lorenz, Robert M.; Kuo, Jason S.; He, Mingyan; Allen, Peter B.; Mutch, Sarah; Kuyper, Christopher L.; Fiorini, Gina S.; Lim, David S. W.
PA USA
SO U.S. Pat. Appl. Publ., 31 pp.
PI US 2005048581 A1 20050303 US 2004-926656 20040825
PRAI US 2003-497874P P 20030825
AB A method and system for performing biochem. detection or anal. on micro- and nanoscale subcellular component within a single biol. cell is provided. An integrated platform device and method to perform the biochem. anal. is also provided.

L18 ANSWER 30 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 141:376461 CA
TI **Optical tweezers** applied to a **microfluidic** system
AU Enger, Jonas; Goksoer, Mattias; Ramser, Kerstin; Hagberg, Petter; Hanstorp, Dag
CS Department of Physics, Chalmers University of Technology and Goeteborg University, Goeteborg, SE-412 96, Swed.
SO Lab on a Chip (**2004**), 4(3), 196-200
AB We will demonstrate how **optical tweezers** can be combined with a **microfluidic** system to create a versatile microlab. Cells are moved between reservoirs filled with different media by means of **optical tweezers**. We show that the cells, on a timescale of a few seconds, can be moved from one reservoir to another without the media being dragged along with them. The system is demonstrated with an expt. where we expose E. coli bacteria to different fluorescent markers. We will also discuss how the system can be used as an advanced cell sorter. It can favorably be used to sort out a small fraction of cells from a large population, in particular when advanced microscopic techniques are required to distinguish various cells. Patterns of channels and reservoirs were generated in a computer and transferred to a mask using either a sophisticated electron beam technique or a std. laser printer. Lithog. methods were applied to create microchannels in rubber silicon (PDMS). Media were transported in the channels using electroosmotic flow. The optical system consisted of a combined confocal and epi-fluorescence microscope, dual **optical tweezers** and a laser scalpel.

L18 ANSWER 55 OF 138 CA COPYRIGHT 2008 ACS on STN
Full Text
AN 140:153912 CA
TI Optical recovery of **particles** on a **chip** toward cell **sorting** and **bead**-bed detection
AU Hirano, Ken; Baba, Yoshinobu
CS Department of Medicinal Chemistry, CREST, JST, The University of Tokushima, Tokushima, 770-8505, Japan
SO Micro Total Analysis Systems 2002, Proceedings of the μTAS 2002 Symposium, 6th, Nara, Japan, Nov. 3-7, 2002 (**2002**), Volume 1, 272-274. Editor(s): Baba, Yoshinobu; Shoji, Shuichi; Van den Berg, Albert.

Publisher: Kluwer Academic Publishers, Dordrecht, Neth.

AB The authors have developed a method of **particle** recovery for **chip**-based cell **sorter**. Using optical **gradient force**, the technique can recovery **particles** at irradiating position of a laser by resisting hydrodynamic force. This paper presents the method and examples of **particle** recovery method using optical **gradient force** for cell **sorting** on a **chip**.

L18 ANSWER 58 OF 138 CA COPYRIGHT 2008 ACS on STN

AN 140:119628 CA

TI Laser **tweezers** and **Raman** spectroscopy systems and methods for the study of microscopic **particles**

IN Li, Yong-qing; Dinno, Mumtaz A.

PA East Carolina University, USA

SO U.S. Pat. Appl. Publ., 28 pp.

PI US 2004012778 A1 20040122 US 2002-196649 20020716

PRAI US 2002-196649 A 20020716

AB A method of studying a selected microscopic **particle** is described entailing forming an **optical trap** for a selected microscopic **particle** with a laser beam at a first power level, the laser beam having a variable power level assocd. therewith; increasing the variable power level assocd. with the laser beam to a second power level; producing **Raman** scattering signals with the laser beam at the second power level, wherein the second power level provides sufficient excitation energy to the selected microscopic **particle** to produce **Raman** scattering signals and wherein the second power level is greater than the first power level; and detecting a **Raman** spectrum from the **Raman** scattering signals produced by the laser beam at the second power level to thereby study the selected microscopic **particle**. A system for studying selected microscopic **particles** is also described comprising a diode laser for producing a laser beam having at least a first and second power level, wherein the laser beam at the first power level is sufficient for optically trapping a selected microscopic **particle** immersed in an aq. soln. medium, wherein the second power level provides sufficient excitation energy to the selected microscopic **particle** to produce **Raman** scattering signals for a **Raman** spectrum, and wherein the second power level is greater than the first power level; a beam splitter positioned to selectively direct the laser beam in a first direction and to selectively direct the **Raman** scattering signals radiating from the selected microscopic **particle** in a second direction; a container for contg. the selected microscopic **particle** immersed in the aq. soln., wherein the container is positioned to receive the laser beam in the first direction; and a **Raman** spectrograph detector positioned to receive the **Raman** scattering signals in the second direction.

L18 ANSWER 60 OF 138 CA COPYRIGHT 2008 ACS on STN

AN 140:73338 CA

TI Compact microscope-based **optical tweezers** system for molecular **manipulation**

AU Sischka, Andy; Eckel, Rainer; Toensing, Katja; Ros, Robert; Anselmetti, Dario

CS Faculty of Physics, Experimental Biophysics and Applied Nanosciences, Bielefeld University, Bielefeld, 33615, Germany
SO Review of Scientific Instruments (**2003**), 74(11), 4827-4831
AB A compact single beam **optical tweezers** system for force measurements and **manipulation** of individual double-stranded **DNA** (**DNA**) mols. was integrated into a com. inverted optical microscope. A maximal force of 150 pN combined with a force sensitivity of less than 0.5 pN allows measurements of elastic properties of **single mols.** which complements and overlaps the force regime accessible with at. force microscopy (AFM). The **manipulation** and measurement performance of this system was tested with individual λ-**DNA** mols. and renders new aspects of dynamic forces phenomena with higher precision in contrast to AFM studies. An integrated liq. handling system with a fluid cell allows investigation of the force response of individual **DNA** mols. in the presence of **DNA** binding agents. Comparison of YOYO-1-, ethidium bromide intercalated **DNA**, and distamycin-A complexed **DNA** revealed accurate and reproducible differences in the force response to an external load. This opens the possibility to use it as a **single mol.** biosensor to investigate **DNA** binding agents and even to identify mol. binding mechanisms.

L18 ANSWER 65 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 139:273205 CA
TI Multichannel flow cell for interacting single optically trapped, **DNA** molecules with different chemical species
IN Brewer, Laurence R.; Balhorn, Rodney L.
PA The Regents of the University of California, USA
SO U.S. Pat. Appl. Publ., 8 pp.
PI US 2003186426 A1 20031002 US 2001-809944 20010314
PRAI US 2000-189381P P 20000315
AB A multichannel flow cell is used to laminarly flow different chem. solns., including one made up of small polystyrene **beads** attached to individual **DNA** mols., side by side with little mixing. An **optical trap** is used to pull single **DNA** mols. via their attached polystyrene **beads** into each of the different chem. solns. or species sequentially, and the resultant change in the structure of the **DNA** mol. can be obsd. using fluorescence microscopy. The technique can be used with mols. other than **DNA**. Examples of different chem. species include condensing agents such as protamine, enzymes, **polymerases**, and fluorescent probes and tages.

L18 ANSWER 69 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 139:166452 CA
TI Laminar flow-based separations of colloidal and **cellular particles**
IN Oakey, John; Marr, David W. M.
PA Colorado School of Mines, USA
SO PCT Int. Appl., 47 pp.
PI WO 2003066191 A1 20030814 WO 2003-US3480 20030204
US 2003159999 A1 20030828 US 2003-248653 20030204
PRAI US 2002-354372P P 20020204
US 2003-248653 A1 20030204
AB A system, method and app. employing the laminar nature of fluid flows in **microfluidic** flow devices in sepg., **sorting** or filtering colloidal

and/or **cellular particles** from a suspension in a **microfluidic** flow device is disclosed. The **microfluidic** flow devices provide for sepg. a **particle** in a suspension flow in a **microfluidic** flow chamber. The chamber includes a **microfluidic** flow channel comprising at least one inlet port for receiving a suspension flow under laminar conditions, a first outlet port and a second outlet port. The chamber further includes an interface for translating a **particle** within the channel. The first outlet port receives a first portion of the suspension exiting the channel and the second outlet port receives the **particle** in a second portion of the suspension exiting the channel.

L18 ANSWER 70 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 139:161622 CA
TI Development of an **optical tweezer** combined with micromanipulation for **DNA** and protein nanobioscience
AU Soni, G. V.; Hameed, Feroz Meeran; Roopa, T.; Shivashankar, G. V.
CS National Centre for Biological Sciences, Tata Institute of Fundamental Research, UAS-GKVK Campus, Bangalore, 560 065, India
SO Current Science (**2002**), 83(12), 1464-1470
AB The authors have constructed an **optical tweezer** using two lasers (830 nm and 1064 nm) combined with micropipette **manipulation** having sub-pN force sensitivity. Sample position is controlled within nanometer accuracy using XYZ piezo-elec. stage. The position of the **bead** in the trap is monitored using single **particle** laser backscattering technique. The instrument is **automated** to operate in const. force, const. velocity or const. position measurement. The authors present data on single **DNA** force-extension, dynamics of **DNA** integration on membranes and optically trapped **bead**-cell interactions. A quant. anal. of single **DNA** and protein mechanics, assembly and dynamics opens up new possibilities in nano-bioscience.

L18 ANSWER 86 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 137:239404 CA
TI **Confocal Raman** Microscopy for Monitoring Chemical Reactions on Single Optically Trapped, Solid-Phase Support **Particles**
AU Houlne, Michael P.; Sjostrom, Christopher M.; Uibel, Rory H.; Kleimeyer, James A.; Harris, Joel M.
CS Department of Chemistry, University of Utah, Salt Lake City, UT, 84112-0850, USA
SO Analytical Chemistry (**2002**), 74(17), 4311-4319
AB **Optical trapping** of small structures is a powerful tool for the **manipulation** and study of colloidal and **particulate** materials. The tight focus excitation requirements of **optical trapping** are well suited to confocal **Raman** microscopy. An inverted confocal **Raman** microscope is developed for studies of chem. reactions on single, optically trapped **particles** and applied to reactions used in solid-phase peptide synthesis. **Optical trapping** and levitation allow a **particle** to be moved away from the coverslip and into soln., avoiding fluorescence interference from the coverslip. More importantly, diffusion of reagents into the **particle** is not inhibited by a surface, so that reaction conditions mimic those of **particles** dispersed in soln. **Optical trapping** and levitation also maintain optical alignment, since the

particle is centered laterally along the optical axis and within the focal plane of the objective, where both optical forces and light collection are maximized. Hour-long observations of chem. reactions on individual, trapped SiO2 **particles** are reported. Using two-dimensional least-squares anal. methods, the **Raman** spectra collected during a reaction can be resolved into component contributions. The resolved spectra of the time-varying species can be obsd., as they bind to or cleave from the **particle** surface.

L18 ANSWER 90 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 137:2709 CA
TI Optical switching and **sorting** of biological samples and **microparticles** transported in a **micro-fluidic** device, including integrated bio-**chip** devices
IN Wang, Mark; Ata, Erhan; Esener, Sadik
PA The Regents of the University of California, USA
SO PCT Int. Appl., 52 pp.

PI	**WO 2002044689**	**A2**	**20020606**	**WO 2001-US45058**	**20011128**
	US 2002181837	**A1**	**20021205**	**US 2001-998012**	**20011128**
PRAI	US 2000-253644P	P	20001128		
	US 2001-998012	A	20011128		

AB Small **particles**, for example 5 μm diam. **microspheres** or cells, within, and moving with, a fluid, normally water, that is flowing within **microfluidic** channels within a radiation-transparent substrate, typically molded PDMS clear plastic, are selectively **manipulated**, normally by being pushed with optical pressures forces, with a laser light switching beam, preferably as arises from vertical cavity surface emitting lasers (VCSELs) operating in Laguerre-Gaussian mode, at branching junctions, such as an "X", in the **microfluidic** channels so as to enter into selected downstream branches OUTPUT 1, OUPUT 2, thereby realizing switching and **sorting** of **particles**, including in parallel. Transport of the small **particles** thus transpires by **microfluidics** while **manipulation** in the manner of **optical tweezers** arises either from pushing due to optical scattering force, or from pulling due to an attractive optical **gradient force**. Whether pushed or pulled, the **particles** within the flowing fluid may be optically sensed, and highly-parallel. Low-cost, cell- and **particle**-anal. devices efficiently realized, including as integrated on bio-**chips**.

L18 ANSWER 108 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 134:144014 CA
TI **Automation** of **optical tweezers**
AU Hsieh, Tseng-Ming; Chang, Bo-Jui; Hsu, Long
CS Inst. Electro-Optics, National Chiao-Tung Univ., Taiwan
SO Proceedings of SPIE-The International Society for Optical Engineering (**2000**), 4082(Optical Sensing, Imaging, and Manipulation for Biological and Biomedical Applications), 232-240
AB **Optical tweezers** is a newly developed instrument, which makes possible the **manipulation** of micro-optical **particles** under a microscope. In this paper, we present the **automation** of an **optical tweezers** which consists of a modified **optical tweezers**, equipped with two motorized actuators to deflect a 1 W argon laser beam, and a computer control system including

a joystick. The trapping of a single **bead** and a group of lactoacidofilus was shown, sep. With the aid of the joystick and two auxiliary cursors superimposed on the real-time image of a trapped **bead**, we demonstrated the simple and convenient operation of the **automated optical tweezers**. By steering the joystick and then pressing a button on it, we assign a new location for the trapped **bead** to move to. The increment of the motion 0.04 μ m for a 20X objective, is negligible. With a fast computer for image processing, the **manipulation** of the trapped **bead** is smooth and accurate. The **automation** of the **optical tweezers** is also programmable. This technique may be applied to accelerate the **DNA hybridization** in a gene **chip**. The combination of the modified **optical tweezers** with the computer control system provides a tool for precise **manipulation** of micro **particles** in many scientific fields.

L18 ANSWER 111 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 134:27248 CA
TI Highly sensitive **bead**-based multi-analyte assay system using **optical tweezers**
IN Liu, Yagang
PA Beckman Coulter, Inc., USA
SO U.S., 12 pp.
PI US 6159749 A 20001212 US 1998-119837 19980721
PRAI US 1998-119837 19980721
AB An app. and method for chem. and biol. anal. are disclosed, the app. having an **optical trapping** means to **manipulate** the reaction substrate, and a measurement means. The **optical trapping** means is essentially a laser source capable of emitting a beam of suitable wavelength (e.g., Nd:YAG laser). The beam impinges upon a dielec. **microparticle** (e.g., a 5 μ polystyrene **bead** which serves as a reaction substrate), and the **bead** is thus confined at the focus of the laser beam by a radial component of the **gradient force**. Once "trapped," the **bead** can be moved, either by moving the beam focus, or by moving the reaction chamber. In this manner, the **bead** can be transferred among sep. reaction wells connected by microchannels to permit reactions with the reagent affixed to the **bead**, and the reagents contained in the individual wells.

L18 ANSWER 113 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 133:263336 CA
TI An integrated laser trap/flow control **video** microscope for the study of single biomolecules
AU Wuite, Gijs J. L.; Davenport, R. John; Rappaport, Aaron; Bustamante, Carlos
CS Department of Physics, University of California, Berkeley, CA, 94720, USA
SO Biophysical Journal (**2000**), 79(2), 1155-1167
AB We have developed an integrated laser trap/flow control **video** microscope for mech. **manipulation** of single biopolymers. The instrument is automated to maximize exptl. throughput. A single-beam **optical trap** capable of trapping micron-scale polystyrene **beads** in the middle of a

200-μm-deep microchamber is used, making it possible to insert a micropipette inside this chamber to hold a second **bead** by suction. Together, these **beads** function as easily exchangeable surfaces between which macromols. of interest can be attached. A computer-controlled flow system is used to exchange the liq. in the chamber and to establish a flow rate with high precision. The flow and the **optical trap** can be used to exert forces on the **beads**, the displacements of which can be measured either by **video** microscopy or by laser deflection. To test the performance of this instrument, individual biotinylated **DNA** mols. were assembled between two streptavidin **beads**, and the **DNA** elasticity was characterized using both laser trap and flow forces. **DNA** extension under varying forces was measured by **video** microscopy. The combination of the flow system and **video** microscopy is a versatile design that is particularly useful for the study of systems susceptible to laser-induced damage. This capability was demonstrated by following the translocation of transcribing RNA **polymerase** up to 650 s.

L18 ANSWER 129 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 126:115424 CA
TI **Optical trap** for detection and quantitations of **subzeptomolar** quantities of analytes
IN Weetall, Howard Hayyam; Helmerson, Kristian Peter; Kishore, Roni Bakhru
PA National Institute of Standards and Technology, USA; Weetall, Howard Hayyam; Helmerson, Kristian Peter; Kishore, Roni, Bakhru
SO PCT Int. Appl., 23 pp.

PI	**WO 9641154**	**A1**	**19961219**	**WO 1996-US10007**	**19960607**
	US 5620857	**A**	**19970415**	**US 1995-473979**	**19950607**
PRAI	US 1995-473979	A	19950607		

AB Tightly focused beams of laser light are used as "**optical tweezers**" to trap and **manipulate polarizable** objects such as **microspheres** of glass or latex with diams. on the order of 4.5 μm. When analytes are allowed to adhere to the **microspheres**, small quantities of these analytes can be **manipulated**, thus allowing their detection and quantitations of the analytes are extremely small. Illustrative examples include measuring the strength needed to break antibody-antigen bonds and the detection of **DNA sequences**.

L18 ANSWER 130 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 126:86779 CA
TI Chemical, biochemical and biological reactions, sequence analysis, and processing in thin film regions using **particles** and **optical traps**
IN Ulmer, Kevin M.
PA Seq, Ltd., USA; Ulmer, Kevin M.
SO PCT Int. Appl., 43 pp.

PI	**WO 9639417**	**A1**	**19961212**	**WO 1996-US8633**	**19960604**
	US 5776674	**A**	**19980707**	**US 1995-462485**	**19950605**
PRAI	US 1995-462485	A1	19950605		
	WO 1996-US8633	W	19960604		

AB An **optical trap** is used to translate a **particle** through a thin film coating on an optically-flat surface. Preferably, the thin film coating is heterogeneous and the **optical trap** is used to move the **particle**

through a succession of different regions of the thin film coating where different chem., biochem. and/or biol. processes take place. Examples of chem., biochem. and/or biol. processes that might be implemented in accordance with the invention include the following: oligonucleotide synthesis and sequencing, peptide synthesis and sequencing, carbohydrate synthesis and sequencing, combinatorial library synthesis and **screening**, and conventional (i.e., Sanger or Maxam-Gilbert) **DNA** sequencing. In one embodiment of the invention, reaction products are left behind as the **particle** is moved through the thin film coating. Advantageously, these products can be identified by suitable means.

L18 ANSWER 131 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 126:85218 CA
TI The combined optical, electrostatic and **enzymic** handling of single **DNA** molecules
AU Hoyer, Carsten; Monajembashi, Shamci; Greulich, Karl Otto
CS Dep. Single Cell Single Molecules Techniques, Inst. Molecular Biotechnology, Jena, 07745, Germany
SO Proceedings of SPIE-The International Society for Optical Engineering (**1996**), 2928(Biomedical Systems and Technologies), 188-199
AB Complete handling of single **DNA** mols. and their **enzymic** restriction are described. For that purpose a **microsphere** was bound to a **DNA** mol. and **trapped** by **optical tweezers**. It could be moved in any direction. For stretching or rotating the mol. an elec. field was applied while the **bead** was fixed by the **optical tweezers**. In a near-equil. state of the resulting forces, the **DNA** remained stretched. Subsequently, a restriction endonuclease was activated by liberating Mg2+ from a caged compd. The **enzymic** reaction could be directly obsd. in the light microscope. While the **bead** remained in the focus of the laser trap the other restricted part of the **DNA** mol. is pulled away in the elec. field. The reaction was directly monitored and recorded on videotape.

L18 ANSWER 133 OF 138 CA COPYRIGHT 2008 ACS on STN
AN 124:337102 CA
TI Study of **optical trapping** and fluorescence detection in flow streams with applications to **DNA sequencing**
AU Wang, W.; Liu, Y.; Sonek, G.J.; Berns, M.W.; Keller, R.A.
CS Department of Electrical and Computer Engineering, University of California, Irvine, CA, 92717, USA
SO Proceedings of SPIE-The International Society for Optical Engineering (**1996**), 2629(Biomedical Optoelectronics in Clinical Chemistry and Biotechnology), 70-7
AB We report on the development of a flow system integrated with a microscope that facilitates the simultaneous **optical trapping** and fluorescence excitation/detection of micron-sized samples that have been tagged with fluorescent probes. This system, when used in conjunction with nucleotide fluorescence labeling and **DNA** fragment cleavage procedures, offers the potential for the rapid **sequencing** of **DNA** fragments attached to **microsphere** "handles". Using a Nd:YAG laser (1064 nm) as the trapping beam, latex **microspheres** were stably trapped in a flow stream, where flow velocities in the range of 1-10mm/s were achieved. Such flow velocities are commensurate with those required to

stretch, and measure fluorescence from, **DNA** strands in high speed **sequencing** applications. High spatial resoln. (~1μm) and high signal-to-noise ratios (>103) were achieved using a high N.A. objective lens for trapping and fluorescence detection within a confocal microscope geometry. In this system, samples could be displaced with the scanning laser trap by up to ±25μm off the trapping beam axis in the sample plane while maintaining, at the same time, a large fluorescence detection efficiency. At a trapping depth of 20μm below the chamber surface, a laser power of 100mW was sufficient to hold a 2μm diam. **microsphere** in a flow stream having a velocity of 1mm/s while its fluorescence was measured. The results of a systematic study which investigates the effects of trapping efficiency, trapping depth, flow velocity, and **tweezers** holding time in a 500μmx500μm flow microchamber system are reported. The application of this technique to the confinement and detection of fluorescence-labeled **DNA** nucleotides is also described.

=> d bib,ab l21 1-71

L21 ANSWER 60 OF 71 BIOSIS on STN
AN 1998:121025 BIOSIS
TI Direct measurement of **DNA** molecular length in solution using **optical tweezers**: Detection of looping due to binding protein interactions.
AU Sakata-Sogawa, Kumiko [Reprint author]; Kurachi, Masashi; Sogawa, Kazuhiro; Fujii-Kuriyama, Yoshiaki; Tashiro, Hideo
CS Lab. Photo-Biol., Photodyn. Res. Cent., Inst. Phys. and Chem. Res., 19-1399 Koeji, Nagamachi, Aoba-ku, Sendai 980, Japan
SO European Biophysics Journal, (**1998**) Vol. 27, No. 1, pp. 55-61.
AB **DNA** looping is caused by the interaction between **DNA** binding proteins located at separate positions on a **DNA** molecule and may play an important role in transcription regulation. We have developed a system to stretch single **DNA** molecules and to measure changes in molecular length. **DNA** molecules were prepared and 5' end-labeled by PCR amplification. Two **beads** and the intervening **DNA** molecule were trapped and **manipulated** independently with dual **trap optical tweezers**. The trapped **DNA** molecule was then stretched and the extension (the distance between the two **beads**) was measured. The extension at the specific tension force of 30 pN was calculated and used as a molecular length. The molecular length was found to be proportional to the base pair number. The rise per residue was calculated to be 3.31+-0.05 ANG. The length measurement was applied to **DNA** fragments containing GC box **sequences** at two different locations separated by a distance of 2.428 kbp. The addition of GC box binding transcription factor Sp1 shortened the molecular length, suggesting **DNA** looping forms as a result of interaction between transcription factors.

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